

Keiki Produce Prescription (KPRx) Program Feasibility Study to Reduce Food Insecurity and Obesity Risk

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Abstract

One in 6 US children experience food insecurity, signifying that at some time during the last year their household did not have sufficient food, money, or resources to feed their family. These children experience little intake of fresh fruits and vegetables (FV), a risk factor for chronic disease, including obesity. Produce prescription programs provide vouchers to purchase fresh FV at participating retailers. The Keiki Produce Prescription (KPRx) Program feasibility study was conducted through a partnership between the Waianae Coast Comprehensive Health Center's Pediatrics and Health Promotion Department's Farmers' Market and the University of Hawai'i nutrition faculty. Pediatricians provided patients with a prescription (Rx) to purchase FV from the Farmers' Market (\$24 per month for three months). Of the 193 Rx distributed, 125 patients participated in part of the program, while 34 completed the full program. Parents, pediatricians, clinic staff, and community members expressed overwhelming support of the program. Parents of participating children completed an exit interview that identified themes surrounding motivation to participate, benefits to child and family, and future recommendations. It identified the need to improve program retention efforts. Participants reported lifestyle benefits for both the child and family and recommended educational resources. A research protocol was developed to address the following objectives: (1) streamline referrals, (2) enhance retention, (3) quantify program impact, and (4) identify barriers to participation. Subsidies have the potential to increase FV consumption, improve overall health, reduce chronic diseases in adulthood, and result in substantial healthcare cost savings.

Keywords

Farmer's market, Federally Qualified Health Centers, Food access, Food insecurity, Fruit and vegetables, Low-income communities

Abbreviations

EMR = Electronic medical record

FQHC = Federally Qualified Health Center

FV = Fruits and vegetables

KPRx = Keiki produce prescription

MF Market = Mākeke Farmers' Market

NHOPI = Native Hawaiian or Other Pacific Islander

Rx = Prescription

SNAP WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

WCCHC = Wai'anae Coast Comprehensive Health Center

Introduction

One in 6 children in the United States (US) live in households that experience food insecurity, signifying that at some time during the last year, their household did not have sufficient food,

money, or resources to feed their family.¹ Children living in food-insecure homes experience low intake of fresh fruits and vegetables (FV) and are at high risk to suffer from overweight or obesity, setting a trajectory for chronic disease in adulthood.²⁻⁴ In Hawai'i, a higher proportion of Native Hawaiian and other Pacific Islander (NHOPI) children live in food-insecure households when compared with the state average (30% and 50%, respectively vs 18%), and 31% of NHOPI children are overweight or obese compared to 27% nationally.⁵⁻⁷ Interventions to improve food insecurity may be an ideal way to improve FV intake and reduce obesity-related health disparities in NHOPI and other children from low-income households.

In adults, increased FV intake is associated with reduced risk of cardiovascular disease, cancer, and premature mortality, while food insecurity is associated with elevated risk.^{8,9} Predictive models demonstrate that prescriptions (Rx) for healthy food, equivalent to a 30% subsidy for FV for Medicare and Medicaid recipients, could increase FV intake by 0.4 servings per day, preventing up to 2 million cardiovascular disease events and yielding \$39.7 billion in health care cost savings.¹⁰

Clinical and community-based interventions to improve FV intake in children have had limited success, with few addressing food insecurity in young families.^{11,12} Adult produce prescription (Produce Rx) programs provide vouchers to purchase fresh FV at a specified retail outlet. Evidence suggests that these programs decrease household food insecurity, increase FV consumption, and improve chronic disease management in adults.¹³ Just \$11 per month in FV vouchers was effective in increasing FV intake and reducing food insecurity in low-income children and adults who participated in the federally-funded Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program.¹⁴ Further, WIC participants who used vouchers at farmers' markets were twice as likely to consume the recommended number of FV servings per day (odds ratio [OR]=2.01, 95% confidence interval [CI]=1.15-3.5).¹⁵ The Wholesome Wave FV Rx program provided FV vouchers to obese children through health care providers at nine Federally Qualified Health Centers (FQHCs) across the United States.¹⁶ The 4- to 6-month intervention enrolled 900 predominately Hispanic or Latino households. Of the 578 who completed the study, there was a significant improvement in food security status (58% vs 76%) and FV consumption (from 2.8 cups/day to 3.1 cups/day).^{16,17}

Health care providers are a potential, underused resource for screening and providing resources to address social determinants of health such as food insecurity.^{16,18} Evidence shows that health care providers can be a “catalyst for change” and impact patient behavior, especially if advice is paired with information and activities that reinforce healthy behaviors.¹⁹ Together, this suggests that interventions aimed at simultaneously reducing food insecurity and increasing FV consumption initiated by healthcare providers and supported by community resources and activities can improve diet and yield significant reductions in health disparities.

While FV incentive programs aim to improve access to and consumption of FV, many patients experience barriers to participation which limit program effectiveness on diet and health outcomes.^{18,20,21} Studies have found inconsistent redemption rates for WIC FV vouchers, citing negative stigma,²⁰ transportation barriers,¹⁵ limited availability of farmers’ markets, inconvenience, and limited quality or variety of FV as significant barriers.²¹ However, there is limited information on factors that influence program participation, including strategies to augment participation in indigenous children from rural communities, including NHOPI. Figure 1 illustrates the pathway to improved health that serves as a framework for FV Rx programs. This paper describes the results of a feasibility study of a community-based pediatric FV Rx program, including support and barriers to participation, and the recommendations for future research.

Methods

The feasibility evaluation took place on the Wai‘anae Coast of O‘ahu, a rural community near Honolulu (population of 43,609), with a high proportion of NHOPI residents (37%). The Wai‘anae Coast Comprehensive Health Center (WCCHC) is the state’s largest FHQC and the leading healthcare and safety net provider on the Coast. To meet the needs of the community, WCCHC’s Health Promotion Department sponsors community food pantries and the Mākeke Farmers’ (MF) Market. MF Market has

three convenient locations along the Wai‘anae Coast and was O‘ahu’s first Farmers’ Market to accept Supplemental Nutrition Assistant Program (SNAP) benefits. Each week approximately 1,600 individuals shop with the MF Market’s more than 35 vendors. The MF Market often provides health education and food demonstrations to shoppers through vendors, the WCCHC Health Promotion staff, and community partners.

The *Keiki* (child) Produce Rx (KPRx) Program is a FVRx program that was developed, implemented, and evaluated through a partnership between the WCCHC Pediatric Clinic, WCCHC Health Promotion Department, and University of Hawai‘i nutrition faculty. Prior to implementing the program, WCCHC’s Health Promotion Department educated pediatric clinic providers and staff about food insecurity, the MF Market services and schedule, and the KPRx. For this feasibility evaluation, partners decided that participants would include children ages 2 to 17 years with “poor nutrition,” based on growth assessment or body mass index percentile for age/sex < 5% or >85%.²² Pediatricians invited eligible patients with their parents or caregivers to participate in the program and clinic staff provided the Rx and informational flyer. Eligible children were invited to participate in the program if a parent was present at the office visit. The child was considered the program participant. Parents received a Rx for each eligible child. Each Rx was good for \$72 in fresh FV (\$24 per month for 3 months). Distribution of KPRx from the pediatric clinic took place between July 2018 and April 2019. Figure 2 depicts the KPRx provided by the pediatrician.

Parents, with or without their child, brought the Rx to the MF Market and exchanged it for vouchers valid for \$24 a month for three months, in fresh FV sold by MF Market vendors. Vouchers were labeled by participant number in order to track redemption. MF Market vendors were informed of the program and provided instruction on eligible purchases. Vouchers themselves were also labeled with allowable purchases (fresh FV only). MF Market and evaluation staff at the MF Market information

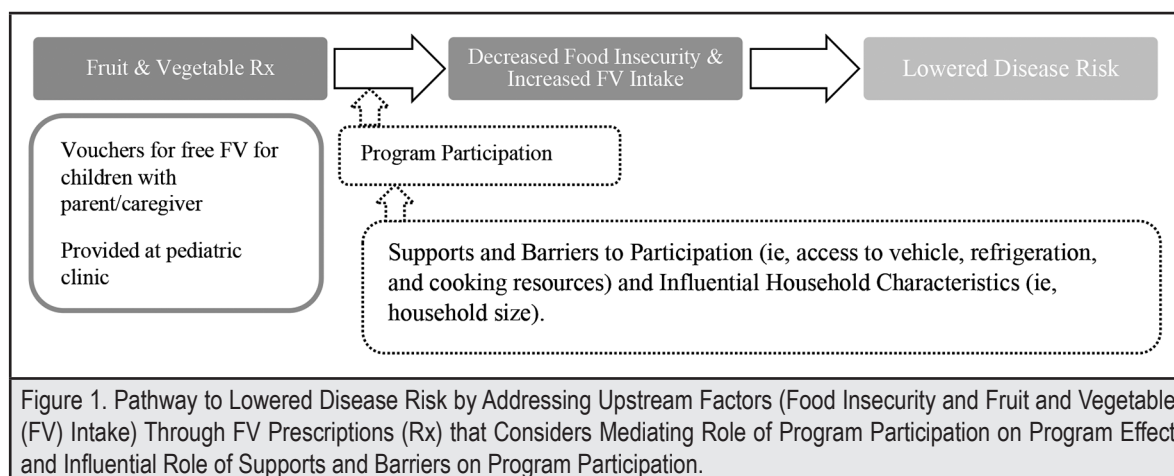
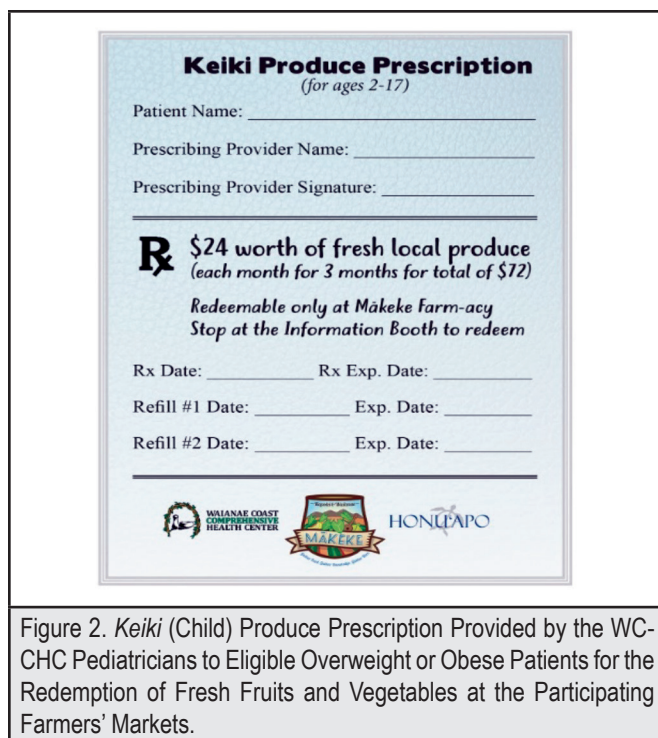


Figure 1. Pathway to Lowered Disease Risk by Addressing Upstream Factors (Food Insecurity and Fruit and Vegetable (FV) Intake) Through FV Prescriptions (Rx) that Considers Mediating Role of Program Participation on Program Effect and Influential Role of Supports and Barriers on Program Participation.



booth were the primary point of contact for KPRx parents and were responsible for providing vouchers, tracking pick-up and redemption, and collecting Keiki Surveys.

Upon completion of the program (defined as redemption of 100% of vouchers), the program assistant contacted parents who had shared their information with the evaluation team, to schedule an interview. Interviews were conducted at the MF Market or over the phone and lasted approximately 15 minutes. Final interview questions are listed in Table 1. Parents of participants were provided an additional \$25 MF Market gift certificate for completing the final interview. Parents who had more than one child in the program completed only one interview, representing all of their children. Responses were transcribed by the program assistant.

Data Analysis

Patterns of participation including Rx distribution by the pediatricians, voucher pick-up and redemption, and Keiki Survey completion were examined. Two researchers analyzed the interview responses independently, then jointly discussed themes to develop a final codebook. Parent statements were coded. The frequency of a theme was quantified by the individual number of times it was mentioned in the responses and frequency by participant. Quantitative data was analyzed using Microsoft Excel (Microsoft Corporation: Redman, Washington). Qualitative data was analyzed manually to identify recurrent themes.

Table 1. Keiki Produce Prescription Program Feasibility Evaluation Exit Interview Questions for Parent/Caregivers.
How did you use the prescriptions?
Which fruits and vegetables did you purchase most often with the prescriptions and why?
Why did you choose to participate in the program?
How did the "farm-acy" prescriptions change you or your family's eating habits?
How has your keiki's feelings towards eating fresh fruits and vegetables changed since starting the program?
If answered positively to the last 2 questions, how do you think you will maintain the changed eating habits or attitudes after the prescription program?
Tell me about your experience in the process of getting the prescription at the doctor's office?
What else could we provide to make it easier for you and your family to get more fresh fruits and vegetables into your home?
What additional information could we provide to you that would make it easier for you and your family to eat more fruits and vegetables in your home?
Do you have any suggestions on how to improve the program?
Is there anything else you would like to share with us?

This feasibility program evaluation was deemed exempt from the Waiānae Coast Comprehensive Health Center Institutional Review Board.

Results

Of the 200 KPRx available, WCCHC pediatricians distributed 193 (97%), and 122 (63%) Rx were at least partially redeemed (Table 2). Thirty four (17%) participants redeemed all their vouchers (\$72 in total) (Table 2). The parents of participants who redeemed all vouchers were contacted for final interviews. Thirty-three participants were represented in final interviews with 21 different parents. The average age of the participating children was 8 years.

Themes identified from the interviews were grouped into the following categories: (1) factors influencing program participation, (2) program effect on children and their families, (3) most enjoyable program components, and (4) factors influencing purchasing decisions. Table 3 outlines themes identified from the interviews.

Factors Influencing Participation

Four themes emerged regarding factors that influenced program participation: (1) increasing affordability and accessibility of FV for the family, (2) supporting child diet and/or interest in attending the farmers' market, (3) receiving encouragement from the pediatrician, and (4) obtaining the FV Rx easily.

Program Effect on Children and Their Families

Four themes emerged regarding effects of the program: (1) the program resulted in family lifestyle changes, (2) improved eating habits, (3) introduction of new FV in the home, and (4) child lifestyle changes such as increasing FV consumption and decreasing processed food consumption. One parent shared, “Knowing that you do have access to the produce allows you

to plan ahead. It makes you want to go to the farmers’ market more.” Participants cited improved household availability of FV (n=12, 57%) and increased awareness of the farmers’ market and the affordable produce available (n=5, 24%).

Components Enjoyed Most

Four themes emerged around the program components enjoyed by participants: (1) financial support for healthy food (n=13, 62%), (2) child involvement (n=9, 43%), (3) FV availability (n=5, 24%), and (4) MF Market (n=5, 24%) attendance. One parent shared, “I got to watch the boy go shopping for fruits and vegetables! He could afford to buy the ones he loved most.”

Influences on Purchasing Decisions

Two themes emerged around factors that influenced purchasing decisions. The first theme was familiarity with FV (n=21, 100%). This theme included parents’ awareness on how to prepare or cook a FV as well as the child’s preference or enjoyment of a particular fruit or vegetable. One parent expressed a response that others shared, “that’s what me and my kids like, and I cook with them (the vegetables).” The second theme was associated with influences on purchasing decisions, which included parents’ knowledge of recipes and meal planning (n=11, 52%).

Total Prescriptions Available	200 (100%)
Number of Children who Received Prescription	193 (96%)
Number of Prescriptions Redeemed at Mākeke Farmer’s Market*	122 (63%)
Number of Children	
Partially redeemed (\$4-\$20) First Voucher	26 (13%)
Fully redeemed (\$24) First Voucher	96 (50%)
Partially redeemed (\$4-\$20) Second Voucher	15 (8%)
Fully redeemed (\$24) Second Voucher	59 (31%)
Partially redeemed (\$4-\$20) Third Voucher	10 (5%)
Fully redeemed (\$24) Third Voucher	47 (24%)
Fully redeemed All Vouchers (\$72)	34 (18%)

*Prescription redemption defined as the prescription from the pediatrician being brought to the Mākeke Farmers’ Market in exchange for first fruit and vegetable voucher (\$24 value).

Category	Theme	Theme Definition	Count (%)
Influencing factors on program participation	Increase affordability and accessibility	Financial help to offset the high costs of fruit and vegetable (FV) to make FV more available in the home	15 (72)
	Interest in supporting child	Interest in improving child’s diet and supporting the child’s interest in attending the farmers market and purchasing FV	8 (38)
	Communication with the pediatrician	Communication with the pediatrician and clinic staff, including informational flyers	11 (52)
	Easy experience in obtaining FV Rx	Easy and fast process in the clinic with staff and pediatricians	20 (95)
Program effect on participants and their families	Family lifestyle changes	Improved eating habits, increased interest in the farmers market, and the introduction of new FV	14 (67)
	Child lifestyle changes	Observed decrease in processed food and increase in FV consumption, increase in physical activity and interest in attending the farmers’ market	11 (52)
	Household accessibility and availability of FV	Increased accessibility and availability of FV in the home	12 (57)
	Increased awareness of the farmers’ market and affordability	Participants learned of the farmers’ market and overcame misconceptions about farmers’ markets being expensive	3 (14)
Most enjoyed program components	Financial help	Participants enjoyed the financial support	13 (62)
	Child involvement	Participants enjoyed the program’s impact on their child and the opportunity for their child to purchase their own FV.	9 (43)
	Fruits and vegetables	Participants enjoyed having FV as a result of this program	5 (24)
	Farmers’ Market	Participants enjoyed attending the farmers’ market due to its location and the opportunity to use the vouchers to buy local produce	5 (24)
Influencing factors on purchasing decisions	Familiarity	Participants purchased FV they were familiar with (knew how to prepare in many ways) or that their child preferred to eat	21 (100)
	Intent to prepare	Participants purchased FV that they had recipes for	11 (52)

Discussion

This KPRx program is both feasible and has the potential to improve FV intake in pediatric patients. Parents reported positive effects on diet and lifestyle for both the referred child and family. They indicated that the information and encouragement from the pediatrician had a positive influence on enrollment. Pediatricians are a trusted source of health information and long-term providers, which collectively motivate families to participate in obesity treatment interventions.²⁰ Moreover, the KPRx program enables pediatricians to support the families' ability to manage their food environment, a strategy endorsed by obesity experts.²⁰

Parents in the KPRx program reported great interest and increased access to FV for the child and family. This is important because inadequate access to FV contributes to poor FV intake in children from food insecure homes.²³ Parents reported increased awareness of MF Market's affordable produce and the enjoyment in going to the MF Market for themselves and their children. This is an important consideration in rectifying misconceptions that many parents, especially those from lower income and minority communities, have about farmers' market fresh produce prices being prohibitively expensive.¹⁵ While this feasibility study did not quantify the effects of the program on their child's diet, parents reported behaviors that implied active FV consumption activities (ie, children selecting and preparing the produce, parents planning meals, and preparing the FV at home).^{24,25} Parents also revealed that they purchased fruits and vegetables that they were most familiar with, supporting the potential benefit of food demonstrations and tastings to expand familiarity with a variety of produce items and methods of preparation.

This study focused on feasibility. The authors did not have the resources to track or reinforce child participation, quantify program outcomes, or implement strategies to increase retention. Consequently, the completion rate was low (17%). To improve participation and retention rate and quantify program effect, future studies should include the following components: (1) streamline referrals and communication between pediatricians and the MF Market staff, (2) enhance retention efforts through communication with parents and share strategies to support families to consume more FV, (3) quantify child and family FV consumption, and (4) identify barriers to participation. Parents expressed enjoyment in bringing their children to the MF Market and the support from the program staff to purchase and prepare healthy food. Future programs can leverage these factors and offer family-centered activities to encourage participation and attendance at the market.

This is the first study to explore the feasibility of a produce Rx program addressing food insecurity and childhood obesity risk in Hawai'i. The collaborative effort employed a unique community-based approach to program development, imple-

mentation, and evaluation. In addition to the limitations of this feasibility study mentioned above, an additional limitation was that interviews were conducted only with families who completed the full program, and did not consider the views and opinions of those families who did not complete the program.

Based on the present feasibility study results, the inherent limitations of this type of study, and input from program partners, a KPRx expanded research protocol was developed. The specific aims included: (1) to quantify the effects of the KPRx on child FV consumption and food insecurity status and (2) to identify facilitators and barriers to participation through qualitative interviews with parents and children. The expanded KPRx protocol is an ongoing study in progress with results that are forthcoming.

In summary, children living in food-insecure homes experience low consumption of fresh FV, and, consequently, suffer from an increased risk for obesity and chronic diseases in adulthood. Despite evidence on the beneficial effects of clinic-based produce Rx and other FV incentive programs have shown, evidence for the impact of these programs in children is lacking. This feasibility study demonstrated that a program of this kind may have a positive impact on children most at risk in Hawai'i. This study has also taken a purposeful approach to ensure that the process is driven from a community needs perspective, by engaging with clinic providers, the WCHC Community Advisory Group, and from solicitation of feedback from the community, to both inform program content and in the development of the future research protocol. Future steps to ensure sustainability include demonstrating positive health outcomes to inform future health care policy to promote healthy eating behavior. Finally, the evolution of this program and the methods utilized could inform other organizations and communities who seek to implement multi-level approaches to reduce and/or eliminate health disparities by linking community and clinical expertise, participation and resources.

Conflict of Interest

None of the authors identified any conflicts of interest.

Acknowledgements

The authors would like to acknowledge Honu'apo and Hawai'i Medical Services Association Foundation for providing funding, the WCHC Pediatric Clinic staff, WCHC pediatric patients, Wai'anae community, and Mākeke Farmers' and Green Market vendors for their contribution to the success of the feasibility study.

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